Claim 9:

A reduced size printed dipole antenna comprising:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side;

(b) a patterned region on each side of said dielectric substrate; and

(c) via holes;

wherein, the patterned region on the front side of said substrate forms a linear, driven conductor and at least one loading patch; said driven conductor has a feed point and two ends; said driven conductor being excitable at said feed point; each said loading patch being connected to an end of said driven conductor, and each said loading patch being shaped to effectively extend the length of said driven conductor; and

wherein, the patterned region on the reverse side of said substrate forms a linear, undriven conductor; and

wherein, said undriven conductor is parallel to said driven conductor, and said undriven conductor is electrically connected to said driven conductor through said via holes.

10. The reduced size printed dipole antenna of Claim 9 wherein feed point is at the center of said driven conductor.

11. The reduced size printed dipole antenna of Claim 9 wherein said via holes are positioned at one end of said driven conductor such that said driven and undriven conductors form a folded dipole.

12. The reduced size printed dipole antenna of Claim 9 wherein said driven and undriven conductors form a parallel strip transmission line.

13. The reduced size printed dipole antenna of Claim 12 wherein the dielectric constant of said dielectric substrate, the lengths of said driven and undriven conductors, and the size and shape of said patches are selected such that said transmission line is antiresonant at the same frequency at which the antenna is resonant.

Claim 14:

A reduced size printed monopole antenna comprising:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side;

(b) a patterned region on each side of said dielectric substrate;

(c) a ground plane; and

(d) via holes;

wherein said dielectric substrate is mounted over said ground plane; and

wherein, the patterned region on the front side of said substrate forms a linear, driven conductor and at least one loading patch; wherein said linear, driven conductor has a first end and a second end and each loading patch is connected to the first end of said linear, driven conductor, and each said loading patch is shaped to effectively extend the length of said driven conductor; and

wherein said linear, driven conductor is excitable by an external conductor; and

wherein the patterned dielectric region on the reverse side of said substrate forms a linear, undriven conductor; wherein said linear, undriven conductor has a first end and a second end; wherein said undriven conductor is parallel to said driven conductor; and wherein the first end of said linear, driven conductor is electrically connected to the first end of said driven conductor through said via holes; and wherein the second end of said undriven conductor is directly connected to said ground plane.

15. The reduced size printed monopole antenna of Claim 14 wherein a dielectric constant of said dielectric substrate, the lengths of said driven and undriven conductors, and the size and shape of said patches are selected such that a double-tuned response is obtainable.

Claim 16

The reduced size printed monopole antenna of Claim 14 wherein said ground plane is a conducting ground plane.

Claim 17

The reduced size printed monopole antenna of Claim 14 wherein said external conductor is fed through said ground plane and electrically attached to said driven conductor.

Claim 18

The reduced size printed monopole antenna of Claim 14 wherein said external conductor is mounted on said ground plane and electrically attached to said driven conductor.

Claim 19

The reduced size printed monopole antenna of Claim 14 wherein said external conductor is printed on said ground plan and electrically attached to said driven conductor.

Claim 20

The reduced size printed monopole antenna of Claim 14 wherein said dielectric substrate is perpendicularly mounted on said ground plane.

Claim 9:

A reduced size printed dipole antenna comprising:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side;

(b) a patterned region on each side of said dielectric substrate; and

(c) via holes;

wherein, the patterned region on the front side of said substrate forms a linear, driven conductor and at least one loading patch; said driven conductor has a feed point and two ends; said driven conductor being excitable at said feed point; each said loading patch being connected to an end of said driven conductor, and each said loading patch being shaped to effectively extend the length of said driven conductor; and

wherein, the patterned region on the reverse side of said substrate forms a linear, undriven conductor; and

wherein, said undriven conductor is parallel to said driven conductor, and said undriven conductor is electrically connected to said driven conductor through said via holes.

10. The reduced size printed dipole antenna of Claim 9 wherein feed point is at the center of said driven conductor.

11. The reduced size printed dipole antenna of Claim 9 wherein said via holes are positioned at one end of said driven conductor such that said driven and undriven conductors form a folded dipole.

12. The reduced size printed dipole antenna of Claim 9 wherein said driven and undriven conductors form a parallel strip transmission line.

13. The reduced size printed dipole antenna of Claim 12 wherein the dielectric constant of said dielectric substrate, the lengths of said driven and undriven conductors, and the size and shape of said patches are selected such that said transmission line is antiresonant at the same frequency at which the antenna is resonant.

Claim 14:

A reduced size printed monopole antenna comprising:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side;

(b) a patterned region on each side of said dielectric substrate;

(c) a ground plane; and

(d) via holes;

wherein said dielectric substrate is mounted over said ground plane; and

wherein, the patterned region on the front side of said substrate forms a linear, driven conductor and at least one loading patch; wherein said linear, driven conductor has a first end and a second end and each loading patch is connected to the first end of said linear, driven conductor, and each said loading patch is shaped to effectively extend the length of said driven conductor; and

wherein said linear, driven conductor is excitable by an external conductor; and

wherein the patterned dielectric region on the reverse side of said substrate forms a linear, undriven conductor; wherein said linear, undriven conductor has a first end and a second end; wherein said undriven conductor is parallel to said driven conductor; and wherein the first end of said linear, driven conductor is electrically connected to the first end of said driven conductor through said via holes; and wherein the second end of said undriven conductor is directly connected to said ground plane.

15. The reduced size printed monopole antenna of Claim 14 wherein a dielectric constant of said dielectric substrate, the lengths of said driven and undriven conductors, and the size and shape of said patches are selected such that a double-tuned response is obtainable.

Claim 16

The reduced size printed monopole antenna of Claim 14 wherein said ground plane is a conducting ground plane.

Claim 17

The reduced size printed monopole antenna of Claim 14 wherein said external conductor is fed through said ground plane and electrically attached to said driven conductor.

Claim 18

The reduced size printed monopole antenna of Claim 14 wherein said external conductor is mounted on said ground plane and electrically attached to said driven conductor.

Claim 19

The reduced size printed monopole antenna of Claim 14 wherein said external conductor is printed on said ground plan and electrically attached to said driven conductor.

Claim 20

The reduced size printed monopole antenna of Claim 14 wherein said dielectric substrate is perpendicularly mounted on said ground plane.

Claim 21

A parasitic reduced size printed dipole antenna element comprising:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side; and

(b) a patterned region on said front side of said dielectric substrate;

wherein, the patterned region on the front side of said substrate forms a linear conductor and loading patches; said linear conductor having a first end and a second end; wherein at least one loading patch is connected to said first end of said conductor, at least one loading patch is connected to said second end of said conductor, and each said loading patch is shaped to effectively extend the length of said conductor.

Claim 22

A parasitic reduced size printed monopole antenna element comprising:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side;

(b) a patterned region on the front side of said dielectric substrate; and

(c) a ground plane;

wherein, said substrate is mounted on said ground plane; and

wherein, the patterned region on the front side of said substrate forms a linear conductor and at least one loading patch; said linear conductor has a first end and a second end; each loading patch is connected to said first end of said linear conductor, and each said loading patch is shaped to effectively extend the length of said linear conductor; and

wherein, the second end of said linear conductor is directly connected to said ground plane.

Claim 23

The reduced size printed monopole antenna element of Claim 22 wherein said ground plane is a conducting ground plane.

Claim 24

The reduced size printed monopole antenna element of Claim 22 wherein said dielectric substrate is perpendicularly mounted on said ground plane.

Claim 25

A dipole antenna array comprising at least one reduced size printed dipole antenna, wherein each said reduced size printed dipole comprises:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side;

(b) a patterned region on each side of said dielectric substrate; and

(c) via holes;

wherein, the patterned region on the front side of said substrate forms a linear, driven conductor and at least one loading patch; said driven conductor has a feed point and two ends; said driven conductor being excitable at said feed point; each said loading patch being connected to an end of said driven conductor, and each said loading patch being shaped to effectively extend the length of said driven conductor; and

wherein, the patterned region on the reverse side of said substrate forms a linear, undriven conductor; and

wherein, said undriven conductor is parallel to said driven conductor, and said undriven conductor is electrically connected to said driven conductor through said via holes.

Claim 26

The dipole antenna array of Claim 25 wherein every reduced size printed dipole antenna is on the same substrate.

Claim 27

The dipole antenna array of Claim 25 further comprising a plane mounted perpendicularly to said substrate, said plane comprising transmission strips on at least one surface of said plane, wherein said reduced size printed dipole antennas and said plane are aligned such that the transmission lines on said plane are electrically connected to the feed points of each reduced size printed dipole antenna.

Claim 28

The dipole antenna array of Claim 27 wherein the width of the transmission lines at each feed point is selected to distribute substantially equal power to each antenna.

Claim 29

The dipole antenna array of Claim 25 wherein each reduced size printed dipole antenna is on a separated substrate.

Claim 30

The dipole antenna array of Claim 29 further comprising planes mounted perpendicularly to said substrates, said perpendicularly mounted planes comprising transmission strips on at least one surface of each plane, wherein said reduced size printed dipole antennas and said planes are aligned such that the transmission lines on said planes are electrically connected to the feed points of each reduced size printed dipole antenna.

Claim 31

The dipole antenna array of Claim 30 wherein the width of the transmission lines at each feed point is selected to distribute substantially equal power to each antenna.

Claim 32

A monopole antenna array comprising at least one reduced size printed monopole antenna, wherein each said reduced size printed monopole antenna comprises:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side;

(b) a patterned region on each side of said dielectric substrate;

(c) a ground plane; and

(d) via holes;

wherein said dielectric substrate is mounted over said ground plane; and

wherein, the patterned region on the front side of said substrate forms a linear, driven conductor and at least one loading patch; wherein said linear, driven conductor has a first end and a second end and each loading patch is connected to the first end of said linear, driven conductor, and each said loading patch is shaped to effectively extend the length of said driven conductor; and

wherein said linear, driven conductor is excitable by an external conductor; and

wherein the patterned dielectric region on the reverse side of said substrate forms a linear, undriven conductor; wherein said linear, undriven conductor has a first end and a second end; wherein said undriven conductor is parallel to said driven conductor; and wherein the first end of said linear, driven conductor is electrically connected to the first end of said driven conductor through said via holes; and wherein the second end of said undriven conductor is directly connected to said ground plane.

Claim 33

The monopole antenna array of claim 32 wherein every reduced size printed monopole antenna is on the same substrate.

Claim 34

The monopole antenna array of Claim 32 wherein each reduced size printed monopole antenna is on a separated substrate.

Claim 35

An array of parasitic dipole antenna elements comprising at least one parasitic reduced size printed dipole antenna element, wherein each parasitic reduced size printed dipole antenna element comprises:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side; and

(b) a patterned region on said front side of said dielectric substrate;

wherein, the patterned region on the front side of said substrate forms a linear conductor and loading patches; said linear conductor having a first end and a second end; wherein at least one loading patch is connected to said first end of said conductor, at least one loading patch is connected to said second end of said conductor, and each said loading patch is shaped to effectively extend the length of said conductor.

Claim 36

An array of parasitic monopole antenna elements comprising at least one reduced size printed monopole antenna element, wherein each reduced size printed monopole antenna element comprises:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side;

(b) a patterned region on the front side of said dielectric substrate; and

(c) a ground plane;

wherein, said substrate is mounted on said ground plane; and

wherein, the patterned region on the front side of said substrate forms a linear conductor and at least one loading patch; said linear conductor has a first end and a second end; each loading patch is connected to said first end of said linear conductor, and each said loading patch is shaped to effectively extend the length of said linear conductor; and

wherein, the second end of said linear conductor is directly connected to said ground plane.

Claim 37

The reduced size printed dipole antenna of Claim 9 further comprising a parasitic dipole director element on the front side of said substrate and a parasitic dipole reflector element on the front side of said substrate, wherein said dipole antenna is positioned between said parasitic director element and said reflector element such that a Yagi-Uda type directional array is formed.

Claim 38

The Yagi-Uda Type directional array of claim 33 wherein said parasitic dipole director element is the parasitic reduced size printed dipole antenna element of claim 21.

Claim 39

The Yagi-Uda Type directional array of claim 33 wherein said parasitic dipole reflector element is the parasitic reduced size printed dipole antenna element of claim 21.

Claim 40

The reduced size printed dipole antenna of Claim 9 further comprising a parasitic dipole director element on the front side of a second dielectric substrate and a parasitic dipole reflector element on the front side of a third dielectric substrate, wherein said dipole antenna is positioned between said parasitic director element and said reflector element such that a Yagi-Uda type directional array is formed.

Claim 41

The Yagi-Uda Type directional array of claim 36 wherein said parasitic dipole director element is the parasitic reduced size printed dipole antenna element of claim 21.

Claim 42

The Yagi-Uda Type directional array of claim 36 wherein said parasitic dipole reflector element is the parasitic reduced size printed dipole antenna element of claim 21.

Claim 43:

A reduced size printed dipole antenna comprising:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side;

(b) a patterned region on each side of said dielectric substrate; and

(c) via holes;

wherein, the patterned region on the front side of said substrate forms a linear, driven conductor and at least one loading patch; said driven conductor has a feed point and two ends; said driven conductor being excitable at said feed point; said driven conductor is more narrow than each loading patch; each said loading patch being connected to an end of said driven conductor, and each said loading patch being shaped to effectively extend the length of said driven conductor; and

wherein, the patterned region on the reverse side of said substrate forms a linear, undriven conductor; and

wherein, said undriven conductor is parallel to said driven conductor, and said undriven conductor is electrically connected to said driven conductor through said via holes.

Claim 44:

A reduced size printed dipole antenna comprising:

(a) a dielectric substrate, said dielectric substrate having a front side and a reverse side;

(b) a patterned region on each side of said dielectric substrate; and

(c) via holes;

wherein, the patterned region on the front side of said substrate forms a linear, driven conductor and at least one loading patch; said driven conductor has a feed point and two ends; said driven conductor being excitable at said feed point; each said loading patch being connected to an end of said driven conductor, and each said loading patch being shaped to effectively extend the length of said driven conductor; and

wherein, the patterned region on the reverse side of said substrate forms a linear, undriven conductor; and

wherein, said undriven conductor is parallel to said driven conductor, and said undriven conductor is electrically connected to said driven conductor through said via holes, and

wherein, the positions of via holes at the ends of said driven and undriven conductors are selected such that an electrical connection from said driven conductor to said undriven conductor through said via holes forms a folded dipole.